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Research problems

The purpose of the research problems section is the presentation of unsolved problems in discrete mathematics. Older problems are acceptable if they are not as widely known as they deserve. Problems should be submitted using the format as they appear in the journal and sent to

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Readers wishing to make comments dealing with technical matters about a problem that has appeared should write to the correspondent for that particular problem. Comments of a general nature about previous problems should be sent to Professor Alspach.

Problems 176–177. Posed by Tomaž Pisanski.
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A connected graph G is called *locally cyclic* if the subgraph induced on the set of neighbors of every vertex is a cycle. Similarly, G is called *locally a path* if the subgraph induced on the neighborhood of every vertex is a path. A triangulation of a 2-dimensional complex is said to be *proper* (some authors call it a *clean* triangulation) if its 1-skeleton is a simplicial graph such that each cycle of length 3 determines a triangle of the triangulation.

Problem 176. For which surfaces do there exist triangulations that are locally cyclic, regular graphs and which contain an induced regular subgraph that is locally a path?

Problem 177. (See Problem 176 for definitions.) For each surface determine the least number of vertices of a *proper* triangulation, that is, a triangulation whose 1-skeleton is a locally cyclic graph?

References

[1] N. Hartsfield and G. Ringel, Clean triangulations, Combinatorica 12 (1991) 145–155.
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[3] T.D. Parsons and T. Pisanski, Regular graphs which are locally paths, Combin. Graph Theory, Banach Center Publications, Vol. 25 (PWN-Polish Scientific Publishers, Warsaw, 1989) 127–135.